

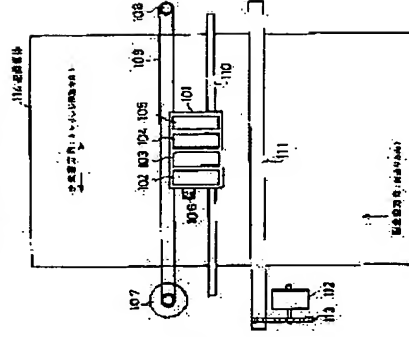
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(54) RECORDER MOUNTED WITH IMAGE READER AND IMAGE CORRECTION METHOD

**PROBLEM TO BE SOLVED:** To provide a recorder with an image reader mounted thereon that reads a correction image to acquire correction data for various corrections and acquires a mean density in a correction image area at a high-speed with high accuracy and to provide an image correction method.

本表明に係る記録位置の形式を示す停止位置明図



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## CLAIMS

[Claim(s)]

[Claim 1] It is a recording device carrying the image reader characterized by to have two amendment means, the 1st and the 2nd, generate the data for having the function which is the recording device which carried the image reading means on carriage, and carries out integral processing of the output corresponding to the concentration of an image into the reading operating time which said image reading means follows, and amending an image according to said integral processing.

[Claim 2] The 1st amendment means is a recording apparatus carrying the image reader according to claim 1 characterized by amending the concentration unevenness of former image data based on said image data read and obtained according to the property of the recording head with which has the function which amends an image from the image data read with said image reading means, and the recording apparatus was equipped.

[Claim 3] The 2nd amendment means is a recording apparatus carrying the image reader according to claim 1 characterized by amending the record location of image data based on said image data read and obtained according to the property of the recording head with which has the function which amends an image from the image data read with said image reading means, and the recording apparatus was equipped.

[Claim 4] Said image reading means is a recording device carrying the image reader according to claim 1 characterized by being CCD series.

[Claim 5] Said image reading means is a recording device carrying the image reader according to claim 1 characterized by being MOS image sensors.

[Claim 6] Said image reading means is a recording device carrying the image reader according to claim 1 characterized by being CMOS image sensors.

[Claim 7] It is the image amendment approach of a recording device of having carried the image reading means on carriage. Said image reading means has the function to integrate with the output corresponding to the concentration of an image in the continuous reading operating time. It has two amendment means, the 1st and the 2nd, to generate the data for amending an image according to said integral processing. The step which amends the concentration unevenness of former image data based on the image data read and obtained with the image reading means according to the property of the recording head with which the recording device was equipped. The image amendment approach characterized by including the step which amends the record location of image data based on the image data read and obtained with the image reading means according to the property of the recording head with which the recording device was equipped.

[Translation done.]

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the recording device and the image amendment approach of having carried image readers, such as image formation equipment which amends the unevenness of the record concentration in image recording.

[0002] It is effective to the image formation equipment about the approach for determining correction value in detail which used the ink jet recording head which comes to arrange two or more nozzles especially, and the image formation equipment which used the thermal-transfer-recording head which comes to arrange two or more sensible-heat objects.

[0003]

[Description of the Prior Art] As current and the record approach, the hot printing method which makes recorded media, such as paper, imprint the ink of an ink ribbon with heat energy, the ink jet recording method which records by making the drop made to fly adhere to recorded media, such as paper, are known, for example.

[0004] The ink jet recording method is widely used for the printer since [ which ] implementation of the low noise, a low running cost, the miniaturization of equipment, and colorization is easy, the copying machine, etc. also in these.

[0005] As for the recording device using such an ink jet recording method, it is common to use the recording head by which the accumulation array of two or more record components was carried out in order to raise a recording rate. As the record component, a nozzle, an ink delivery, etc. which make ink breathe out are included, for example.

[0006] In the case of the serial scanning method which a recording head scans to a main scanning direction, in such an ink jet recording device, the record unevenness (henceforth " \*\*\* unevenness ") which appears in the shape of \*\*\* along a main scanning direction as one of the factors of an image quality fall is mentioned.

[0007] \*\*\* unevenness tends [ very ] to be [ appearing periodically in many cases ] conspicuous in that case. For example, in order to carry out the regurgitation of the ink from each delivery in the so-called multi-nozzle type with which two or more deliveries of ink were prepared of recording head, although the exoergic energy of the exoergic heater (electric thermal-conversion object) located all over the ink passage which is open for free passage to each delivery is used, the cause of generating of \*\*\*\*\* made that it is a degree is mentioned to a case. That is, migration of the difference of concentration change of the ink produced according to the discharge quantity of the ink resulting from dispersion at the time of manufacture of the magnitude of the exoergic heater in a nozzle unit or a delivery, dispersion of a discharge direction, the gap with the amount of conveyances of recorded media (the amount of paper feeds) and recording width in the case of a serial scanning method, and a record time lag and the ink on recorded media etc. causes [ of \*\*\* unevenness ] generating.

[0008] Conventionally, such \*\*\* unevenness is abolished and the method of attaining high definition-ization is proposed variously.

[0009] There is the division record approach (the multi-pass record approach) of completing the record over one record section on recorded media by the scan of the multiple times of a

recording head as one of the approach of the. The approach of such division record is very effective in erasing \*\*\* and unevenness.

[0010] However, in order to fully raise the effectiveness, the count of a scan of the recording head to one record section, i.e., the number of partitions, must be increased, the record section completed for every one scan of a recording head will become small, and the fall of a throughput will be caused.

[0011] As other methods of suppressing generating of \*\*\* unevenness, there is the head shading approach which is indicated by JP 5-69545A, for example, without using the approach of such division record. This approach is enforced in sequence as shown in drawing 5.

[0012] First, the test pattern for correction value decision beforehand set up using the recording head is recorded on recorded media (step S11), and the record concentration of the recorded test pattern is read with a scanner (step S12). After carrying out location amendment for the reading image suitably and equalizing the concentration of the image in the direction of a column (main scanning direction) (step S13), it assigns to the raster which corresponds for every nozzle of a recording head (step S14). Change of record concentration is produced by a gap of the ink discharge quantity in every nozzle and a discharge direction, or blot of the ink on recorded media. In the following step S15, the correction value of the record concentration for every nozzle is calculated and determined from the concentration data assigned for every raster at step S14.

[0013] And the image data for every nozzle is amended based on the correction value (step S16).

[0014] Specifically gamma table for every nozzle is changed, or the drive table for every nozzle is changed, and the discharge quantity of ink etc. is changed. About the raster which is amended by the amendment of image data based on such correction value so that it may become thin, and is thinly recorded in a condition without amendment about the raster deeply recorded in a condition without amendment, it is amended so that it may become deep, and the unevenness of record concentration is reduced. Especially the approach of changing the output gamma table for every nozzle, and changing and amending the concentration of former image data itself is very effective in amendment of record concentration unevenness.

[0015] Furthermore, how to record an image without \*\*\* or unevenness in whole floor tone level is also indicated by JP 5-69545A by also taking input gradation into consideration, and not amending about a low-concentration record section, but amending about a high-concentration record section.

[0016] Moreover, a trouble when performing image formation, using two or more heads as other factors of an image quality fall is mentioned. It is a problem in the case of having specifically produced gap of the impact location of a dot among two or more heads in the printing equipment which has two or more heads.

[0017] When performing an image print, how many kinds of image formation is performed combining that color in many cases, and, as for most one, it is common to use yellow, a Magenta, and four colors that added black to the three primary colors of cyanogen further. Color gap will be caused if colors which are different although based also on the amount of gaps when using two or more print heads for printing these colors and there is gap of an impact location between print heads are printed on the same pixel. For example, in the part with which the dot of both colors has lapped, although a Magenta and cyanogen are used for forming a blue image, although it becomes blue, in the part which has not lapped, it will not become blue but color gap that each independent tint appears will be produced. Even if this occurs partly, it is not conspicuous, but if this phenomenon follows a scanning direction and it generates, it will become color gap of the shape of a band of a certain specific width of face, and will become an uneven image.

Furthermore, in the field which adjoins it by the image of the same color, if there is no gap of the impact location of a dot, a feeling of homogeneity will differ from coloring between adjoining image fields, and it will become what has sense of incongruity as an image. Moreover, although gap of this color is not so much conspicuous with a regular paper, when using the good record medium of coloring, such as coat paper, it may be conspicuous.

[0018] Moreover, when printing a different color on the adjoining pixel, and there is gap of the

impact location of a dot, the field which is not covered with the part by the clearance, i.e., ink, may be generated, and the ground of a record medium may appear directly. Since a record medium generally has many white things, this phenomenon is called a "white omission" in many cases. This phenomenon tends to be conspicuous with the strong image of contrast, and a white clearance without ink will exist between black and a chromatic color, and since the contrast between white and black is strong, it may be conspicuous by the case where a black image is formed by making a chromatic color into the background, clearly.

[0019] In order to control generating of the above problems, it is effective to perform the above-mentioned dot alignment. About this approach, it has specifically proposed in this person's JP, 11-291553.A.

[0020] Moreover, in it, the bidirectional printing approach is also described as a high speed technique of a print. Aiming at increment in a print element number, improvement in the scan speed of a print head, etc. in the print head which specifically has two or more print components is considered, and it is also one effective approach to perform the print scan of both-way both directions of a print head. Although it does not usually become simple proportionality in a printing equipment since there is time amount, such as feeding and delivery, compared with a unidirectional print, as for bidirectional printing, a twice [about] as many print rate as this can be obtained.

[0021] However, the following problems will be caused to bidirectional printing.

[0022] First, when printing the ruled line (vertical ruled line) of a direction perpendicular to the main scanning direction of a print head, a level difference will arise, without a ruled line turning into a straight line, without a location suiting between the ruled line printed on an outward trip, and the ruled line printed in a return trip. Although this is called the so-called "ruled line gap", it can be said to be being turbulence of the most common image that a common user recognizes. Although it has been recognized as a problem at the time of generally forming a monochrome image since the ruled line was black and it was formed in many cases, the phenomenon with the same said of a color picture happens.

[0023] Moreover, when a multi-scan print is used together for high-definition-izing, even if an impact location does not suit with bidirectional printing, the gap by pixel level is seldom conspicuous but as effectiveness of a multi-scan print, and if it sees in macro, the whole image is visible to an uniformity and it may recognize as an unpleasant pattern for some users.

Although this is generally called the texture, it will generate with appearing on an image with a specific period with gap of a delicate impact location. It may be conspicuous, when the contrast of a monochrome image etc. tends to be conspicuous in a strong image and it performs a halftone print to the record medium in which high concentration prints, such as coat paper, are possible.

[0024] the print position doubling approach between print position doubling during the both-way scan of a print head [in / as stated above / in JP, 11-291553.A / a printing equipment], or two or more print heads -- receiving -- simple and precision -- the print position doubling approach performed highly is offered.

[0025] If the approach is explained briefly, in the complementary print by the both-way scan of a head, or two or more heads, two or more patterns which shifted print initiation timing the specified quantity every will be printed to the dot (outgoing scanning or formation dot by one head) used as criteria. The area factor by the dot formed with the print shall respond for shifting, and these patterns shall change. Two or more of these patterns are optically read as average concentration.

[0026] It is said that the timing corresponding to a part with the read highest average concentration is set up as print position doubling conditions.

[0027]

[Problem(s) to be Solved by the Invention] In the above-mentioned conventional example, it is automatic within a recording device, moreover, the above amendment actuation is performed with a sufficient precision, and it is very effective for a user. However, in the conventional example of an upper way, in order to acquire the data for amending, the image for amendment is recorded, and the step of reading the concentration of the recorded image is surely needed.

[0028] When you needed reading of many images for amendment here, much time amount was spent on the reading actuation, as a result the technical problem that the whole adjustment time amount will be lengthened occurred.

[0029] The image for amendment set as the object of reading in reading of image concentration on the other hand has the area of a certain finite, and it is rare in all those area that it is uniform concentration. Moreover, when an image is seen in micro, since it is formed by the single dot, in case all images read image concentration, they need to acquire the average data in the area of finite theoretically. As technique for raising the precision of the reading data, the technique of equalizing a multiple-times deed and two or more acquired image concentration data was taken, changing a reading location for the reading actuation from the same image area in area conventionally. In that case, since actual reading actuation would be performed more [far] numbers of times than the number of the images for amendment which should be read, it had brought a result reading actuation (average image concentration acquisition) takes much time amount further.

[0030] This invention was accomplished in view of the above-mentioned situation, and aims at offering the recording device and the image amendment approach of having carried the image reader which it is moreover accurate and enables the acquisition of the average concentration in the image area for amendment at a high speed in reading of the image for amendment for acquiring the amendment data at the time of performing various amendments.

[0031]

[Means for Solving the Problem] This invention can solve the above-mentioned technical problem by having the following configuration.

[0032] (1) It is a recording device carrying the image reader characterized by to have two amendment means, the 1st and the 2nd, generate the data for having the function which is the recording device which carried the image reading means on carriage, and carries out integral processing of the output corresponding to the concentration of an image into the reading operating time which said image reading means follows, and amending an image according to said integral processing.

[0033] (2) the -- one -- amendment -- a means -- said -- an image -- reading -- a means -- having read -- image data -- from -- an image -- amending -- a function -- having -- a recording apparatus -- equipping -- having had -- a recording head -- a property -- responding -- said -- reading -- obtaining -- having had -- image data -- being based -- former -- image data -- concentration -- unevenness -- amending -- things -- the description -- \*\* -- carrying out -- the preceding clause -- ( -- one -- ) -- a publication -- an image -- a reader -- having carried -- a recording apparatus .

[0034] (3) the -- two -- amendment -- a means -- said -- an image -- reading -- a means -- having read -- image data -- from -- an image -- amending -- a function -- having -- a recording apparatus -- equipping -- having had -- a recording head -- a property -- responding -- said -- reading -- obtaining -- having had -- image data -- being based -- image data -- record -- a location -- amending -- things -- the description -- \*\* -- carrying out -- the preceding clause -- ( -- one -- ) -- a publication -- an image -- a reader -- having carried -- a recording apparatus .

[0035] (4) Said image reading means is a recording device carrying the image reader given in the preceding clause (1) characterized by being CCD series.

[0036] (5) Said image reading means is a recording device carrying the image reader given in the preceding clause (1) characterized by being MOS image sensors.

[0037] (6) Said image reading means is a recording device carrying the image reader given in the preceding clause (1) characterized by being CMOS image sensors.

[0038] (7) It is the image amendment approach of a recording device of having carried the image reading means on carriage. Said image reading means has the function to integrate with the output corresponding to the concentration of an image in the continuous reading operating time. It has two amendment means, the 1st and the 2nd, to generate the data for amending an image according to said integral processing. The step which amends the concentration unevenness of former image data based on the image data read and obtained with the image reading means

according to the property of the recording head with which the recording device was equipped. The image amendment approach characterized by including the step which amends the record location of image data based on the image data read and obtained with the image reading means according to the property of the recording head with which the recording device was equipped. [0039] In order to solve a technical problem, the function to integrate with the output corresponding to the concentration of the image in the reading operating time which follows an image reading means is added. Further namely, with said image reading means By carrying out the scanning and processing of the inside of the predetermined field of the image for amendment during continuous reading actuation, it is the average concentration in the image area for amendment (although it is integral density strictly, and it can be found by \*(ing) by scanning time amount when average concentration is required), making scanning time amount regularity equivalent -- average concentration -- becoming -- it is considered as the configuration to acquire.

[0040] Thereby, it is possible to take in continuously the concentration data in the image area for amendment, and the acquisition of the data is enabled at highly precise and a high speed compared with the average value by the conventional sampling data of two or more points.

[0041]

[Embodiment of the Invention] The gestalt of operation concerning this invention is explained below.

[0042] The explanatory view showing the average-concentration data reading approach of the image for amendment which the explanatory view showing the average-concentration data reading approach of the image for amendment according [ the explanatory view and drawing 3 which shows the important section configuration of the reading means in the recording device which the typical explanatory view showing the configuration of the recording device which drawing 1 requires for this invention, and drawing 2 require for this invention ] to the conventional method, and drawing 4 require for this invention, and drawing 5 are the flow charts which show the conventional correction-value decision approach.

[0043] In drawing 1, 101 is the carriage for carrying an image recording head, and two or more image recording heads 102, 103, 104, and 105 with an another case are carried on this carriage 101. The image recording heads from which this plurality differs are heads for image recording of two or more colors at the time of recording a color picture (the head for black image recording, the head for yellow image recording, the head for Magenta image recording, head for cyanogen image recording, etc.). Moreover, the image reading means 106 for reading the image recorded on the record medium 114 is attached in said carriage 101.

[0044] The carriage 101 which carried the image recording heads 102-105 has the composition of performing a guide rail 110 to a guide and performing both-way actuation right and left (main scanning direction), with the belt 109 supported by the pulley 108 by making a motor 107 into a driving source. It is possible to move said image reading means 106 to a main scanning direction to a record medium 114 by this.

[0045] Moreover, it has the composition that a record medium 114 is conveyed in the vertical direction (the direction of vertical scanning), with the conveyance roller 111 which rotates through a gear 113 by making a motor 112 into a driving source. It is possible to move the image reading means 106 in the direction of vertical scanning to a record medium 114 by this.

[0046] In drawing 2, 201 is an image reading means and shows optical reflective mold image sensors by this example. This sensor has arranged the light-emitting part 202 and the light sensing portion 203 inside, to the image 206 for amendment used as the test pattern for the various image amendments recorded on the record medium 205 from the light-emitting part 203, or record location amendment, irradiates light and receives the amount of reflected lights according to that image concentration from said light-emitting part 202 by said light sensing portion 203.

[0047] Therefore, the output according to image concentration occurs in a light sensing portion 203, time quadrature of that output is carried out by the integral means 204, and it has the composition that finally this integrator output is outputted from said image reading means 201. [0048] Next, an approach to read the average concentration data of the image for amendment

concerning an approach to read the average concentration data of the conventional image for amendment and this invention based on drawing 3 and drawing 4 is explained.

[0049] In drawing 3, in order to ask for the average concentration of the image for amendment conventionally, it read in the location shown by a-o in drawing 3, and the sensor was moved, the sensor output in each location was read, and the average concentration data of the image for amendment were read by calculating the average value. In this case, since an error would arise in average concentration, shifting the location to read finely if more sample data are not taken, much time amount had been spent on reading and equalization processing of reading data.

[0050] On the other hand, although drawing 4 is an approach to read this invention, since the integral means is arranged at the reading sensor itself, it becomes possible by carrying out the sequential integral of the output to obtain the total of an output according to the concentration followed between A-B, making a sensor scan toward A→B in drawing 4. Although it asks by \*(ing) by scanning time amount here when average concentration is required, it is performing the relative comparison of the image concentration for amendment in most cases, and it is possible to treat as average concentration data equivalent by making scanning time amount regularity. Thus, the scanning and processing of the inside of the image area for amendment are carried out continuously, and since it is possible to obtain the concentration, it becomes possible to obtain the data nearer to the average concentration of the original image for amendment in reading actuation once.

[0051] When the case where a straight line is made to scan the inside of the image area for amendment with the operation gestalt concerning this invention of drawing 4 is shown and the left combines horizontal scanning and vertical scanning in drawing 1, it cannot be overemphasized that the inside of the image area for amendment can be scanned to arbitration.

[0052] Moreover, although it can say that it is the most suitable sensor since it has the function in which CCD series, MOS image sensors, or CMOS image sensors specifically accumulates the charge by which photo electric conversion was carried out into the sensor as a reading means of this invention (integral), integrating an analog integrator with the output of the usual photosensor can also be realized.

[0053]

[Effect of the Invention] As explained above, according to this invention, it is possible to take in continuously the concentration data in the image area for amendment, and acquisition of the data is attained at a high speed with high precision compared with the average value by the conventional sampling data of two or more points. Therefore, in various image amendments or record location amendment, the time amount which the adjustment takes can be shortened and it becomes possible to aim at improvement in adjustment precision conventionally further.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

- [Drawing 1] The typical explanatory view showing the configuration of the recording device concerning this invention
- [Drawing 2] The explanatory view showing the important section configuration of the reading means in the recording device concerning this invention
- [Drawing 3] The explanatory view showing the average concentration data reading approach of the image for amendment by the conventional method
- [Drawing 4] The explanatory view showing the average concentration data reading approach of the image for amendment concerning this invention
- [Drawing 5] The flow chart which shows the conventional correction value decision approach [Description of Notations]
- 101 Carriage
- 102,103,104,105 Image recording head
- 106,201 Image reading means
- 107 Motor
- 108 Pulley
- 109 Belt
- 110 Guide Rail
- 111 Conveyance Roller
- 112 Motor
- 113 Gear
- 114,205 Image recording medium
- 202 Light-emitting Part
- 203 Light Sensing Portion
- 204 Integral Means
- 206 Image for Amendment (Test Pattern)

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最終頁に続く

(54) 【発明の名称】 画像読み取り装置を搭載した記録装置及び画像補正方法

(57) 【要約】

【課題】 各種補正を行う際の補正データを取得するた  
めの補正用画像の読み取りにおいて、その補正用画像エ  
リア内の平均傾度を高速にしかも精度良く取得可能とす  
る画像読み取り装置を搭載した記録装置及び画像補正方  
法の提供。

【解決手段】 画像読み取り手段106をキャリッジ1  
01上に搭載した記録装置であって、前記画像読み取り  
手段106は逆轉する読み取り動作時間中に画像の傾度  
に对应する出力を積分する機能を有し、前記積分処理に  
応じて、補正するデータを生成する第1及び第2の  
補正手段からなることを特徴とする。

本発明に係る記録装置の構成を示す模式的説明図

図1は、本発明に係る記録装置の構成を示す模式的説明図である。図中、111は記録装置の本体、110はキャリッジが移動する軌道、101はキャリッジ、106はキャリッジ上に搭載された読み取り手段を示す。107、108、109、110、111、112、113は各部品の参照番号である。矢印はキャリッジの移動方向と読み取り手段の動作方向を示している。



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平5-69545号公報に記載されているようなヘッドシェーディング方法がある。この方法は図5に示すような順序で実施される。

【0012】まず、記録ヘッドを用いて予め設定された補正値決定用のテストパターンを描記記録媒体上に記録し（ステップS11）、その記録されたテストパターンの記録速度をスキヤナーによって読み取る（ステップS12）。その読み取り画像を適当に位置補正をした後、その面の速度をカメラ方向（主走査方向）に平均化してから（ステップS13）、記録ヘッドのノズル毎に対応するラスターに割り付ける（ステップS14）。記録速度の変化は、ノズル毎におけるインク吐出量や吐出方向のずれ、または被記録媒体上におけるインクのにじみなどによって生じる。次のステップS15においては、ステップS14にてラスター毎に割り付けられた速度データから、ノズル毎の記録速度の補正値を計算し決定する。

【0013】そして、その補正値に基づいて、ノズル毎の画像データを補正する（ステップS16）。

【0014】具体的に、ノズル毎のYデータを変更したり、ノズル毎の移動方向を変えて、インクの吐出量などを変える。このような補正値に基づいて画像データの補正により、補正無しの状態においてより正確に補正されるラスターについては、それが暗くなるように補正され、また、補正無しの状態においてより明るく記録されるラスターについては、それが暗くなるように補正されて、記録速度のむらが低減される。特に、ノズル毎の出力方向を変えて、元画像データの速度そのものを交換して補正する方法は、記録速度むらの補正に極めて有効である。

【0015】更に、特開平5-69545号公報には、入力階調も考慮して、低速度の記録領域に関しては補正せず、高速度の記録領域に関しては補正することにより、全階調レベルにおいて、すじやむらのない画像を記録する方法も記載されている。

【0016】また画面低下の他の要因として、描数ヘッドを用いて画像形成を行う上での問題点が挙げられる。具体的には、描数ヘッドを有するプリント装置において、描数のヘッド間でドットの箱弾位置のズレを生じてしまった場合の問題である。

【0017】画像プリントを行う場合、何層何かの色を組み合わせて画像形成を行うことが多く、最も多いのは、イエロー、マゼンタ、シアンの3原色に更にブラックを加えた4色を用いるのが一般的である。これらの色をプリントするための描数のプリントヘッドを用いる場合において、プリントヘッド間で箱弾位置のズレがあるのと、ずれ量にもよるが異なる色同士が同じ画像にプリントされると色ズレを起してしまう。例えば、青の画像を形成するのにマゼンタおよびシアンを用いるが、青色のドットが重なっている部分では青になるものの、重なり

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っていない部分では青にはならずそれぞれの単独の色味が現れるという色ズレを生じてしまう。これが一部分で起きても目立つこととはないが、この現象が走査方向に更親して発生してしまうと、ある特定の幅のバンド方向の色ズレと不均一な画像になってしまう。更に、同じ色の画像でそれ以降に隣接する領域において、ドットの箱弾位置のズレがないと、隣接する画像領域間で均一感や発色が異なり、画像として違和感のあるものになってしまう。また、この色のズレは、被記録紙ではさほど目立つことはないが、コート紙等の発色の良い記録媒体を用いる場合に目立つてしまうことがある。

【0018】また、異なる色を隣接する画素にプリントする場合、ドットの箱弾位置のズレがあるとその部分に隣接する色インクにより覆われた領域が生じてしまい、記録媒体の地が直視見えてしまうことがある。記録媒体は一般的に白地のものが多いので、この現象は「白抜け」と呼ばれることが多い。この現象はコントラストの強い画像で目立ちやすく、有彩色をバックグラウンドとして黒画像を形成する場合等では黒色と有彩色との間のインクのない白い隙間が存在することになり、白と黒との間のコントラストが強いゆえにまぎれと目立つてしまうことがある。

【0019】以上のような問題の発生を抑制するために、前述のドットライアメントを行うのが有効である。この方法については、具体的には本出願者の特開平11-29153号公報にて提案している。

【0020】また、その中でも、プリントの高速化技術として、双方方向のプリント方法についても述べられている。具体的には複数のプリント素子を有するプリントヘッドにおいてプリント素子の増加やプリントヘッドの走査速度の向上等を図ることも考えられているが、プリントヘッドの往復双方方向のプリント走査を行うことも1つの有効な方法である。プリント装置では通常、粘紙・排紙等の時間が有るため単純な比例関係にはならないが、双方向プリントは片方向プリントに比べて約2倍のプリント速度を得ることができ。

【0021】しかしながら双方方向プリントに対しては以下のような問題を引き起こしてしまう。

【0022】まず、プリントヘッドの主走査方向に垂直な方向の野線（縦野線）をプリントする場合、往路でプリントする野線と復路でプリントする野線との間で位置が合わずに野線が直線にならずに段差が生じてしまう。これは所謂「野線ズレ」と称されているものであるが、一般的にユーザーが認識する最も一般的な画像の乱れであると考ええる。野線は黒色で形成される場合が多いので、一般的にモノクローム画像を形成する際の問題として認識されていたが、カラー画像でも同様の現象は起こるのである。

【0023】また、走面質化のためにマルチ走査プリントを併用する場合、双方方向プリントで箱弾位置が合わ

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くても、マルチ走査プリントの効果として画質レベルでのズレは余り目立たないが、マクロ的に見れば画像全体が不均一に見え、ユーザによっては不快な機嫌として認識してしまうこともある。これを一般的にテクスチャと呼ぶ上では、微妙な箱弾位置のズレによる特定の周知で画像上に現れることで発生してしまうのである。モノクローム画像等のコントラストが強い画像において目立ち易く、また、コート紙等の高速度プリントが可能ない記録媒体等に対して中間調プリントを行う場合に目立つことがある。

【0024】以上述べたように、特開平11-29153号公報はプリント装置におけるプリントヘッドの往復走査期間でのプリント位置合わせや複数のプリントヘッド間のプリント位置合わせ方法に対し、簡易かつ精度高く行うプリント位置合わせ方法を提供するためのである。

【0025】その方法を簡単に説明するならば、ヘッドの往復走査または複数のヘッドによる相補的プリントにおいて、基準となるドット（往走または一方のヘッドによる形成ドット）に対して、プリント開始タイミングを所定量づつずらした複数のパターンをプリントする。これらパターンは、そのプリントにより形成されるドットによるエリアアクタがずらしに応じて変化するものとする。この複数のパターンを平均的な速度として光学的に読み取る。

【0026】読み取った平均速度が最も高い部分に対応するタイミングをプリント位置合わせ条件として設定するといったものである。

【0027】【発明が解決しようとする課題】上述の従来例では、以上の様な補正動作を記録装置内に自動で、しかも精度良く行うものであり、ユーザにとっては非常に有効なものである。しかしながら、上掲の従来例においては、補正を行うためのデータを取得するために補正用画像を記録し、その記録された画像の速度を読み取るというステップが必要となる。

【0028】ここで数多くの補正用画像の読み取りを必要とする場合、その読み取り動作に多くの時間が費やされ、延いては全体の調整時間を長くしてしまうという課題があった。

【0029】一方、画像速度の読み取りにおいて、読み取りの対象となる補正用画像はある有数の面積を有しており、その全てのエリアにおいて均一な速度であることは稀である。また、ミクロ的に画像を見た場合、画像は全て単一ドットで形成されているため、画像速度を読み取る必要は、原理的に有限のエリア内の平均データを取得する必要がある。その読み取りデータの精度を上げるための手法として、従来、同一画像エリアからの読み取り動作を、読み取り場所をエリア内で変換しながら複数回を行い、取得した複数の画像速度データを平均化する手法が取られていた。その場合、実際の読み取り動作は、読

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むべき補正用画像の数よりもはるかに多い回数行うことになるため、一度読み取り動作（平均画像速度取得）に多くの時間がかかってしまう結果となっていた。

【0030】本発明は、上述の事項に鑑みて成されたもので、各種補正を行う際の補正データを取得するための補正用画像の読み取りにおいて、その補正用画像エリア内の平均速度を高速にしかも精度良く取得可能な画像読み取り装置を構築した記録装置及び画像補正方法を提供することを目的とする。

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【0031】【課題を解決するための手段】本発明は、下記構成を備えることにより上記課題を解決できるものである。

【0032】（1）画像読み取り手段をキャリアッジ上に搭載した記録装置であって、前記画像読み取り手段は連続する読み取り動作時間中に画像の速度に対応して、画像を補正する為のデータを生成する第1及び第2の二つの補正手段を備えることを特徴とする画像読み取り装置を搭載した記録装置。

【0033】（2）第1の補正手段は、前記画像読み取り手段で読み取った画像データから画像を補正する機能とを有し、記録装置に搭載された記録ヘッドの特性に応じて前記読み取って得られた画像データに基づいて元画像データの速度むらを補正することを特徴とする前項データの速度むらを補正する装置。

（1）記載の画像読み取り装置を搭載した記録装置。【0034】（3）第2の補正手段は、前記画像読み取り手段で読み取った画像データから画像を補正する機能とを有し、記録装置に搭載された記録ヘッドの特性に応じて前記読み取って得られた画像データに基づいて元画像データの記録位置を補正することを特徴とする前項（1）記載の画像読み取り装置を搭載した記録装置。

【0035】（4）前記画像読み取り手段は、CCDイメージセンサであることを特徴とする前項（1）記載の画像読み取り装置を搭載した記録装置。

【0036】（5）前記画像読み取り手段は、MOSイメージセンサであることを特徴とする前項（1）記載の画像読み取り装置を搭載した記録装置。

【0037】（6）前記画像読み取り手段は、CMOSイメージセンサであることを特徴とする前項（1）記載の画像読み取り装置を搭載した記録装置。

【0038】（7）画像読み取り手段をキャリアッジ上に搭載した記録装置の画像補正方法であって、前記画像読み取り手段は連続する読み取り動作時間中に画像の速度に対応する出力を積分する機能とを有し、前記積分処理に応じて画像を補正する為のデータを生成する第1及び第2の二つの補正手段を備え、記録装置に設置された記録ヘッドの特性に応じて、画像読み取り手段で読み取って得られた画像データに基づいて元画像データの速度むらを補正するステップと、記録装置に搭載された記録ヘッドの特性に応じて、画像読み取り手段で読み取って得

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画像データに基づいて画像データの記録位置を補正するステップとを含むことを特徴とする画像補正方法。

【0039】即ち、誤印を除去するために、画像読み取り手段に、連続する読み取り動作時間中画像の濃度に対する出力を積分する機能を付加し、更に前記画像読み取り手段により、補正用画像の所定の領域内を連続する読み取り動作中にスキャン処理することで、補正用画像エリア内の平均濃度（厳密には積分濃度であり、平均濃度が必要な場合にはスキャン時間を除くことで求める）が、スキャン時間を一定にすることで等価的に平均濃度となる）を取得する構成とした。

【0040】これにより、補正用画像エリア内の濃度データを連続的に取りこむことが可能で、従来の複数点のサンプリングデータによる平均値に比べ、高精度、且つ高画質にそのデータを取得可能とするものである。

【0041】

【発明の実施の形態】以下に本発明に係る実施の形態を説明する。

【0042】図1は、本発明に係る記録装置の構成を示す模式的説明図、図2は、本発明に係る記録装置内の読み取り手段の要部構成を示す説明図、図3は、従来方式による補正用画像の平均濃度データ読み取り方法を示す説明図、図4は、本発明に係る補正用画像の平均濃度データ読み取り方法を示す説明図、図5は、従来の補正決定方法を示すフローチャートである。

【0043】図1において、101は画像記録ヘッドを格納するためのキャリッジであり、このキャリッジ101上に駆動が別なる複数の画像記録ヘッド102、103、104、105が搭載されている。この複数の異なる画像記録ヘッドは、例えば、カラー画像を記録する際の増感色の画像記録用ヘッド（ブラック画像記録用ヘッド、イエロー画像記録用ヘッド、マゼンタ画像記録用ヘッド、シアン画像記録用ヘッドなど）である。また、前記キャリッジ101には記録媒体114上に記録された画像を読み取るための画像読み取り手段106が取り付けられている。

【0044】画像記録ヘッド102～105を搭載したキャリッジ101は、モータ107を駆動源としてブリー108で支持されたベクトル109により、ガイドレール110をガイドに左右（主走査方向）に往復動作を行う構成となっている。これにより、前記画像読み取り手段106を記録媒体114に対して主走査方向に移動させることが可能である。

【0045】また、モータ112を駆動源としてギア113を介して回転する搬送ローラ111により、記録媒体114が上下方向（副走査方向）に搬送される構成となっている。これにより、画像読み取り手段106を記録媒体114に対して副走査方向に移動させることが可能である。

【0046】図2において、201は画像読み取り手段

であり、本実施例では光学式反射型イメージセンサを示す。このセンサは内部に発光部202及び受光部203を配備しており、発光部203より記録媒体205上に記録された各種画像補正や記録位置補正のためのテストパターンとなる補正用画像206に對して前記発光部202より光を照射し、その画像濃度に応じた反射光量を前記受光部203で受ける。

【0047】従って、受光部203では画像濃度に応じた出力が発生し、その出力は積分手段204により時間積分され、最終的にはこの積分出力が前記画像読み取り手段201から出力される構成になっている。

【0048】次に図3及び図4に基づいて、従来の補正用画像の平均濃度データの読み取り方法と本発明に係る補正用画像の平均濃度データの読み取り方法を説明する。

【0049】図3において、従来の補正用画像の平均濃度を求めるため、図3中のa～oで示す位置に読み取りセンサを移動させ、それぞれの位置でセンサ出力を積分し、その平均値を求めることで補正用画像の平均濃度データの読み取りを行っていた。この場合、読み取る位置を細かくずらしながら、より多くのサンプルデータを取らないと平均濃度に誤差が生じてしまうため、読み取り及び読み取りデータの平均化処理に多くの時間を費やしていた。

【0050】これに対して図4は本発明の読み取り方法であるが、読み取りセンサ自体に積分手段を配備しているため、図4中のA～Bに向かってセンサをスキャンさせながらその出力を順次積分することにより、A～B間の連続した濃度に亘じた出力の総和を得ることが可能になる。ここで平均濃度が必要な場合にはスキャン時間除することで求められるが、補正用画像濃度の相对比较を行う場合が殆どで、スキャン時間を一定にすることで、等価的に平均濃度データとして扱うことが可能である。このように、補正用画像エリア内を連続してスキャン処理し、その濃度を得ることが可能なため従来の補正用画像の平均濃度に、より近いデータを一度の読み取り動作で得ることが可能となる。

【0051】図4の本発明に係る実施形態では補正用画像エリア内を直線にスキャンさせる場合について示し、左が、図1における主走査及び副走査を組み合わせたことにより、補正用画像エリア内を任意にスキャン可能であることは言うまでもない。

【0052】また、本発明の読み取り手段としては、具体的にはCCDイメージセンサやMOSイメージセンサ、またはCMOSイメージセンサが、センサ内に光電変換された電荷を蓄積（積分）する機能を有しているため、最も適したセンサであると言えるが、通常のフォトセンサの出力をアナログ積分器で積分する事でも実現可能である。

【0053】

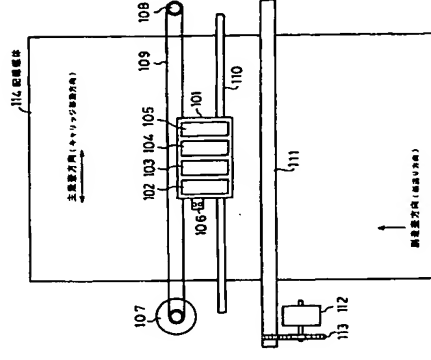
【発明の効果】以上説明したように本発明によれば、補正用画像エリア内の濃度データを連続的に取りこむことが可能で、従来の複数点のサンプリングデータによる平均値に比べ、高精度かつ高画質にそのデータを取得可能となる。従って、各種画像補正や記録位置補正において、その調整に要する時間を短縮可能で、更に高画質も調整精度の向上を図ることが可能となる。

【図面の簡単な説明】

【図1】 本発明に係る記録装置の構成を示す模式的説明図  
 【図2】 本発明に係る記録装置内の読み取り手段の要部構成を示す説明図  
 【図3】 従来方式による補正用画像の平均濃度データ読み取り方法を示す説明図  
 【図4】 本発明に係る補正用画像の平均濃度データ読み取り方法を示す説明図  
 【図5】 従来の補正決定方法を示すフローチャート

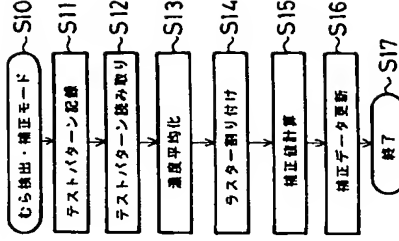
【図1】

本発明に係る記録装置の構成を示す模式的説明図



【図5】

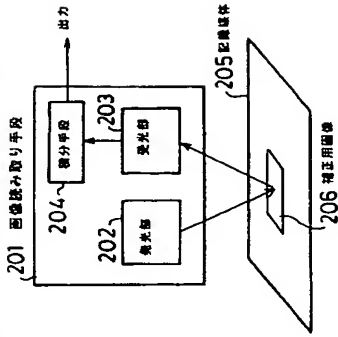
従来の補正決定方法を示すフローチャート



- 【符号の説明】
- 101 キャリッジ
  - 102, 103, 104, 105 画像記録ヘッド
  - 106, 201 画像読み取り手段
  - 107 モータ
  - 108 ブレー
  - 109 ベルト
  - 110 ガイドレール
  - 111 搬送ローラ
  - 112 モータ
  - 113 ギア
  - 114, 205 画像記録媒体
  - 202 発光部
  - 203 受光部
  - 204 積分手段
  - 206 補正用画像（テストパターン）

【図2】

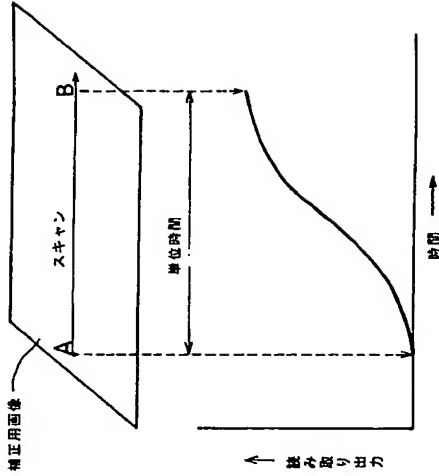
本発明に係る記憶装置内の読み取り手段の要部構成を示す説明図



【図4】

本発明に係る補正用画像の平均速度データ読み取り方法を示す説明図

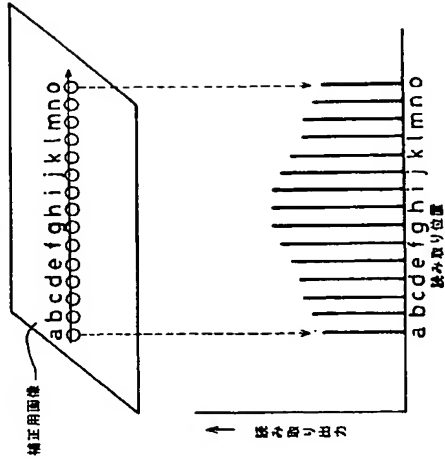
本発明の方法：連続読み取り



【図3】

従来方式による補正用画像の平均速度データ読み取り方法を示す説明図

従来方式：読み取り→移動→読み取りを繰り返す



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